

THE INVENTION CLAIMED IS:

1. A method of assembling a semiconductor package with stacked dies comprising:

providing a substrate;

5 attaching a first die to the substrate;

electrically connecting the first die to the substrate;

attaching a heat sink having an undercut around its periphery to the first die;

attaching a second die to the heat sink;

electrically connecting the second die to the substrate; and

10 encapsulating the first die, the heat sink, and the second die.

2. The method of assembling a semiconductor package with stacked dies as claimed in claim 1 wherein:

electrically connecting the first die to the substrate uses a number of bonding wires;

and

15 attaching a heat sink attaches a heat sink that extends laterally over the number of bonding wires.

3. The method of assembling a semiconductor package with stacked dies as claimed in claim 1 wherein attaching a heat sink attaches a heat sink that is electrically grounded.

20 4. The method of assembling a semiconductor package with stacked dies as claimed in claim 1 wherein attaching a heat sink attaches a heat sink that has an electrically conductive coating, further comprising:

connecting the second die to the electrically conductive coating; and

connecting the electrically conductive coating to a ground plane.

25 5. The method of assembling a semiconductor package with stacked dies as claimed in claim 1 wherein attaching a heat sink attaches a heat sink that extends laterally beyond the edges of the second die.

6. A method of thermally enhancing a semiconductor package with a stack of dies comprising providing a heat sink having an undercut around its periphery between dies
30 in the stack.

7. The method of thermally enhancing a semiconductor package with a stack of dies as claimed in claim 6 wherein:

providing a heat sink attaches a heat sink that extends laterally over the lower die to which the heat sink is attached.

8. The method of thermally enhancing a semiconductor package with a stack of dies as claimed in claim 6 wherein providing a heat sink attaches a heat sink that is electrically grounded.

9. The method of thermally enhancing a semiconductor package with a stack of dies as claimed in claim 6 wherein providing a heat sink attaches a heat sink that has an electrically conductive coating, further comprising:

connecting one of the dies in the stack of dies to the electrically conductive coating; and

connecting the electrically conductive coating to a ground plane.

10. The method of thermally enhancing a semiconductor package with a stack of dies as claimed in claim 6 wherein providing a heat sink attaches a heat sink between each adjoining pair of dies in the stack of dies.

11. A semiconductor package with stacked dies comprising:

a substrate;

a first die attached to the substrate;

the first die being electrically connected to the substrate;

a heat sink having an undercut around its periphery attached to the first die;

a second die attached to the heat sink and electrically connected to the substrate; and

an encapsulant over the first die, the heat sink, and the second die.

12. The semiconductor package with stacked dies as claimed in claim 11 further comprising:

a number of bonding wires electrically connecting the first die to the substrate; and wherein:

the undercut of the heat sink extends laterally over the number of bonding wires.

13. The semiconductor package with stacked dies as claimed in claim 11 wherein the heat sink is electrically grounded.

14. The semiconductor package with stacked dies as claimed in claim 11 wherein:
the heat sink has an electrically conductive coating connected to a ground plane on the
substrate; and
the second die is connected to the electrically conductive coating.

5 15. The semiconductor package with stacked dies as claimed in claim 11 wherein
the undercut of the heat sink extends laterally beyond the edges of the second die.

16. A thermally enhanced semiconductor package with a stack of dies comprising
a heat sink having an undercut around its periphery between dies in the stack.

10 17. The thermally enhanced semiconductor package with a stack of dies as
claimed in claim 16 wherein:
the undercut of the heat sink extends laterally over the die to which the heat sink is
attached.

18. The thermally enhanced semiconductor package with a stack of dies as
claimed in claim 16 wherein the heat sink is electrically grounded.

15 19. The thermally enhanced semiconductor package with a stack of dies as
claimed in claim 16 wherein:

the heat sink has an electrically conductive coating;
one of the dies in the stack of dies is connected to the electrically conductive coating;
and

20 the electrically conductive coating is connected to a ground plane.

20. The thermally enhanced semiconductor package with a stack of dies as
claimed in claim 16 wherein a heat sink is positioned between each adjoining pair of dies in
the stack of dies.